

WHAT IS CLAIMED IS:

- 1 1. An oscillatory neural network computer, comprising:
 - 2 a weighting network having a plurality of output terminals, the weighting network
 - 3 having phase-based connection strengths; and
 - 4 a plurality of phase-locked loop circuits operably coupled with said weighting
 - 5 network.
- 1 2. The oscillatory neural network computer of claim 1, wherein the weighting network
- 2 comprises:
 - 3 first and second weighting circuits, each of the first and second weighting elements
 - 4 having input and output terminals;
 - 5 a first adder circuit having first and second input terminals and an output terminal, the
 - 6 first input terminal of the first adder circuit coupled to the output terminal of the first
 - 7 weighting circuit and the second input terminal of the first adder circuit coupled to the input
 - 8 terminal of the second weighting circuit; and
 - 9 a first bandpass filter circuit having input and output terminals, the input terminal of
 - 10 the first bandpass filter circuit coupled to the output terminal of the first adder circuit.
- 1 3. The oscillatory neural network computer of claim 2, further including:
 - 2 third and fourth weighting circuits, each of the third and fourth weighting circuits
 - 3 having input and output terminals;
 - 4 a second adder circuit having first and second input terminals and an output terminal,
 - 5 the first input terminal of the second adder circuit coupled to the output terminal of the third
 - 6 weighting circuit and the second input terminal of the second adder circuit coupled to the
 - 7 input terminal of the fourth weighting element; and
 - 8 a second bandpass filter circuit having input and output terminals, the input terminal of
 - 9 the second bandpass filter circuit coupled to the output terminal of the second adder circuit.

1 4. The oscillatory neural network computer of claim 2, wherein the plurality of phase-
2 locked loop circuits comprises a phase-locked loop circuit having an output terminal coupled
3 to the input terminal of the first weighting circuit.

1 5. The oscillatory neural network computer of claim 4, further including a first
2 initialization input terminal coupled to the adder circuit.

1 6. The oscillatory neural network computer of claim 1, wherein the weighting network
2 comprises a plurality of weighting circuits coupled to a plurality of bandpass filter circuits
3 through a plurality of adder circuits.

1 7. The oscillatory neural network computer of claim 6, wherein each weighting circuit
2 comprises a linear amplifier.

1 8. The oscillatory neural network computer of claim 7, wherein each weighting circuit
2 further comprises a phase shift circuit coupled to the linear amplifier.

1 9. The oscillatory neural network computer of claim 1, wherein the weighting elements
2 comprise a phase shift circuit.

1 10. The oscillatory neural network computer of claim 1, wherein the weighting circuit
2 further includes a plurality of initialization input terminals.

1 11. An oscillatory neural network computer, comprising:
2 a plurality of connectors, wherein each connector has a phase-encoded connection
3 coefficient; and
4 a plurality of oscillators operably coupled with said plurality of connectors.

1 12. The oscillatory neural network computer of claim 11, further including a plurality of
2 adder circuits coupled between the plurality of connectors and said plurality of oscillators.

1 13. The oscillatory neural network computer of claim 12, further including a plurality of
2 bandpass filter circuits coupled between said plurality of adder circuits and said plurality of
3 oscillators.

1 14. The oscillatory neural network computer of claim 13, wherein the plurality of
2 connectors comprises first, second, third, and fourth connectors, the plurality of adder circuits
3 comprises at least two adder circuits, and wherein the output terminals of first and second
4 connectors are coupled to the input terminals of a first adder circuit and the output terminals
5 of third and fourth connectors are coupled to the input terminals of the second adder circuit.

1 15. The oscillatory neural network computer of claim 14, wherein the plurality of
2 oscillators includes a first oscillator having an output terminal coupled to the first and third
3 connectors and a second oscillator having an output terminal coupled to the second and fourth
4 connectors.

1 16. The oscillatory neural network computer of claim 15, further including a first
2 initialization terminal coupled to the first adder circuit and a second initialization terminal
3 coupled to the second adder circuit.

1 17. The oscillatory neural network computer of claim 11, wherein the plurality of
2 connectors comprises a linear amplifier coupled to a phase shift circuit.

1 18. A method for recognizing an incoming pattern using a neural network computer
2 comprising a phase deviation between a learned pattern and the incoming pattern to create an
3 output signal indicative of the learned pattern.

1 19. The method of claim 18, wherein using the phase deviation includes encoding
2 connection coefficients of the neural network computer in accordance with phase
3 representations of the learned pattern.

1 20. A method for programming a neural network computer comprising encoding
2 connection coefficients of the neural network computer in accordance with phase relationships
3 of a pattern to be learned.

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